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ABSTRACT

The Illinois Inventory of Educational Progress (IIEP) Test Comfort Scale was administered and test results were studied in terms of student achievement and correlates of achievement. Using the revised, seven-item scale, it was determined that: in grade 4, there was no main significant effect for sex or ethnic differences, although Orientals and Whites had more test anxiety than Blacks, Hispanics or American Indians and high achievers in mathematics and reading had higher test comfort than lower achievers. It was also determined that in grade 8: some effect for sex existed: significant ethnic differences occurred, with Orientals showing high test comfort and American Indians high test anxiety. For parental education level and test anxiety of students in grades 8 and 11, it was determined that there was no cross-sex influence and the relationships between test comfort and parental education were generally positive. For eleventh grade students a small but significant sex difference existed, and American Indian and Oriental students manifested the most test anxiety. In all three grades, a positive relationship existed between the number of magazines and newspapers in the home and test comfort. (MH)

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# Test Anxiety, Test Comfort and Student Achievement Test Performance

Educational Testing Service Seminar
July 24, 1979
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by

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Test Anxiety, Test Comfort, and Student Achievement
Test Performance by Leslie J. Fyans, Jr., Ph.D.

I would like to focus upon two perspectives concerning test anxiety. First, I would like to present our measurement instrument itself, the IIEP Test Comfort Scale. Second, I would like to discuss the results in term of student achievement, and correlates of that achievement found with our test comfort scales.

The Test Comfort Scale

Initially, the Illinois Inventory of Educational Progress State Assessment test employed a 12 item (actually 14 including 2 specific indicators) inventory of test comfort. These test comfort items were worded in such a way as to query the student as to how "relaxed" he/she felt during educational evaluation. This is a reverse item form of the well researched Test Anxiety scale (TASC) of Hill (1972) and others. One of the essential benefits of employing a test comfort scale is that there is less need to control to defensiveness and social desirability in student responses (Hill and Sarason, 1968). The IIEP 12 item comfort inventory can be seen on Table 1.

Early on in the data analysis, the internal consistency of the 12 item scale varied from .47 in the 4th grade to .44 in the 8th grade to .51 in the 11th grade. These low internal consistencies indicated that the test comfort scale may indeed be multi-dimensional. Thus, the scale may well have been made up of several heterogeneous indicators of comfort during evaluation.

To determine the extent of this heterogeneity, a factor analysis (maximum liklehood) with a personal probability rotation was computed upon the test comfort scale data at each of 4th, 8th, and 11th grade data. The reference vectors revealed three predominant factors appearing at each of the three grade levels. These factors were:

Factor I: Relaxation During Testing
(Items* 17, 23, 18, 14, and -22)

Factor II: Sense of Educational Competence
(Items 15, 20, 24)

Factor III: The Test Experience Itself
(Items 16, 19, 25)

Co-terminously, another set of analyses examined the item, total scale correlations (with correlation weighted by the inverse of the items standard deviation). Seven of the test comfort scale items had correlation between .29 and .57. These were the items 14, 16, 17, 20, 23, and 24 (see Table 2). As can be seen, except for item #23, all of these 7 items are accounted for in the three factor structure uncovered.

*See Table 1

These 7 items were then used to form a new test comfort scale and the internal consistencies were again calculated. For this new, shorter, test comfort scale the Cronbach's alpha were .64 for 4th grade (increase of .17), .66 for 8th grade (increase of .21) and .71 for 11th grade (increase of .20).

From these data, one could use either of two approaches to measuring test comfort:

a) Measure Test Comfort on a general construct with 7 items.

b) Measure Test Comfort as a multidimensional construct with the full 12 item/three factor scale.

Remember that even if one chose option "a", the 7 items do tap the three factors. The data to be presented now were obtained with the shorter 7 item scale.

Test Comfort and Student Achievement Test Performance

The revised scale has 7 items each of which can be scored "2" (indicating yes) or "1" (indicating no) to questions of being comfortable during testing. Thus a student could score between 1 and 14 across the total inventory with higher scores indicating more comfort. In this light, a few means might prove interesting:

For 4th Grade there did not appear to be a main singificant effect for sex in 4th grade with female mean of 10.91 and male mean of 11.24. Likewise, ethnic differences did not appear too pronounced except in that both Orientals and Whites had more test anxiety than Blacks, Hispanics, and American Indians. Moreover, in terms of their performance, 4th grade students with high achievement in mathematics and reading had higher test comfort than their lower scoring counterparts.

Further, when we classified students into quartiles of expressed test comfort and they ran ANOVA upon the dependent variables of this mathematics and Reading scores significant ($P < .0002$) performance differences were found in both areas. As we continue across grades it might be well to note the range of performance differences between the top quartile in test comfort and the bottom quartile. In 4th grade this performance range is 2.81 in mathematics and 1.18 in reading. This will heighten dramatically in later grades. (However, note that a difference in scoring of 2.81 evan at 4th grade is a 10% performance difference).

Switching Now to 8th Grade Results

At 8th grade there was sex difference (female mean = 10.00/male mean = 10.67) but not too strong ($P < .01$). However, significant ethnic differences were found, particularly between Orientals that expressed very high test comfort (11.15) American Indians who were exceedingly test anxious (9.83).

At 8th and 11th grade, we also tap the variable of parental education level. For parental education, a couple of noteworth results were found in both 8th and 11th grades:

(A) First, there was no-"cross sex" difference influence between parental education and test comfort. Thus, for female students it was the education of the mother that was related to test comfort and for male students it was the father's education level.

(B) Second, these relationships between test comfort and parental education were primarily positive in all ethnic groups.

(C) However, third, for male Orientals there was a negative relationship between (-.47) father's education and the son's test comfort. Likewise, for 11th grade female Blacks there was a negative correlation (-.25) between mother's education and daughter's test anxiety. Perhaps as Oriental fathers and Black mothers become more and more educated (to masters and doctoral level) more and more demand are pressed upon the same sex children.

More importantly, test performance differences begin to really spread out in 8th grade. Again, students were separated into 4 qualities in terms of their level of test comfort and gain extremely significant results were found ($P < .000001$) for mathematics and reading test scores. However, the range (mentioned above) has now increased to 4.19 for mathematics (21% score different) and 2.57 for reading.

Finally for 11th grade a small, yet significant ($P < .01$) sex difference is again found on test comfort with female mean of 9.81 and male mean of 10.69. The ethnic differences again show American Indians as the most test anxious but Oriental students are now expressing just as much test anxiety as the American Indians. (This result will have to be checked each year to determine if it is indeed a developmental shaft for Orientals).

In terms of quartile performance differences by ANOVA again, there were strong and significant differences ($P < .000001$) in mathematics and reading test performance. The range now between the quartiles in 5.93 (33% score difference in achievement) and 3.91 for reading.

There are some other overall results that may be of interest concerning the variables of Parental Involvement and Home Educational Enrichment.

Parental involvement. The correlations between communication with parents and subsequent test comfort were primarily positive for male students at all grade levels. For males, the average correlation between parental involvement and test comfort are $r_{xy} = .32$ for 4th grade, .59 at 8th grade, and .52 at 11th grade.

In contrast to males, female students have correlation which are primarily negative in 4th grade. (Average negative correlation of -.29 between test comfort and parental involvement). However, by 8th and 11th grades the pattern reverses for female students such that in 8th grade the average correlation being $r_{xy} = .48$ and $r_{xy} = .34$ in 11th grades.

These results (and those to be presented later) point to the essential importance of parental involvement in education and reduction of evaluation

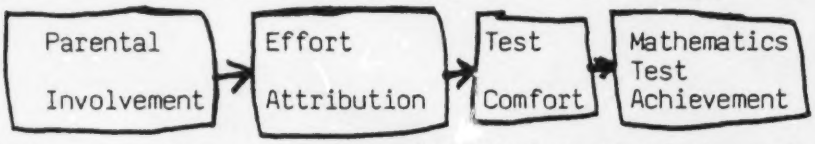
anxiety. Interestingly enough, their data tend to blow away the "folk-lorish" myth that it is not sex role appropriate for male students to focus upon their parent's involvement in the education. (In fact the folklore would predict they would be affectively neutral, negative, or disinterested in their parental involvement in their schooling).

Home Educational Environment. In terms of familial resources positive relationships were found at each grade level (4th, 8th, and 11th) between number of magazines and newspapers in the home and test comfort. The average correlation is approximately $r_{xy} = .22$.

## Summary

In composite, what do all of these data indicate? They show test anxiety as an extremely influential in terms of performances on educational achievement tests. But central to this issue is exactly how does test anxiety cause decrements in performances (or test comfort facilitate achievement)? Ken will discuss this shortly from the perspective of experimental data. Another perspective, one with which I have worked, is that of structural models of achievement test performance. The results of these analyses of "paths to achievement performance" may be the best way to close this presentation. Early on in our endeavors we ran many hierarchical, response-surface multiple regresions onto mathematics (and reading) performance from variables such as test anxiety, ethnics, age, attribution etc. Those regression revealed the potent nature of test anxiety in accounting for up to 35-40% of test performance in upper grades.

Our initial path results now show the interesting pattern of:




Further, analyses will determine to strength of the path. Moreover, it will become necessary to incorporate parental education level in this path since, at least for some ethnic groups, increased parental education increased test anxiety) for Oriental and Blacks. (Perhaps we will find some interactive predictor of test anxiety of parental education parent involvement). Thus it may well be not just whether the parent's communicate but how and what they communicate that is important).

Regardless, it appears that in the very least test anxiety adds errors to the measurement of test performance and achievement and we must pursue our investigation of its antecedents and correlates such that educational testing does not debilitate but facilitates the verdicial expression of student educational achievement.

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TEST COMFORT SCALE
OF THE
ILLINOIS INVENTORY OF EDUCATIONAL PROGRESS
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DEPARTMENT OF PLANNING AND RESEARCH

| Yes | No | | |
|---|---|---|---|
| Y | N | (14) | Do you feel relaxed when the teacher says that he/she is going to ask you questions to find out how much you know? |
| Y | N | (15) | Do you feel sure that you will be promoted to the next grade? |
| Y | N | (16) | Do you like tests in school? |
| Y | N | (17) | Do you feel relaxed before you take a test? |
| Y | N | (18) | Do you feel relaxed while you are taking a test? |
| Y | N | (19) | After you have taken a test, do you soon forget about the test and think about other things? |
| Y | N | (20) | When the teacher says that he/she is going to give the class a test, do you usually feel that you will do good work? |
| Y | N | (21) | When you are taking a hard test, do you remember most things you knew very well before you started taking the test? |
| Y | N | (22) | Do you wish a lot of times that you didn't worry so much about tests? |
| Y | N | (23) | When the teacher says he/she is going to give the class a test, do you feel relaxed and comfortable? |
| Y | N | (24) | While you are taking a test, do you usually think you are doing good work? |
| Y | N | (25) | While you are on your way to school, do you wish a lot of times that the teacher will give a test so you can show him/her how much you know? |

ITEM - TOTAL CORRELATION

For Selected Comfort Items with

Revised Comfort Score

I I E P , 1978

| Items | Grade 4 | 8 | 11 |
|---|---|---|---|
| 1. Do you feel relaxed when the teacher says that s/he is going to ask you questions to find out how much you know? | 0.35 | 0.35 | 0.37 |
| 2. Do you like tests in school? | 0.34 | 0.28 | 0.31 |
| 3. Do you feel relaxed before you take a test? | 0.31 | 0.46 | 0.51 |
| 4. Do you feel relaxed while you are taking a test? | 0.35 | 0.39 | 0.49 |
| 5. When the teacher says that s/he is going to give the class a test, do you usually feel that you will do good work? | 0.31 | 0.32 | 0.37 |
| 6. When the teacher says that s/he is going to give the class a test, do you feel relaxed and comfortable? | 0.49 | 0.51 | 0.57 |
| 7. While you are taking a test, do you usually think you are doing good work? | 0.28 | 0.25 | 0.29 |